



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,510	02/26/2004	Glenn Robert Morton	2018	3990

7590 07/11/2006

William B. Miller
Kerr-McGee Corporation
123 Robert S. Kerr Avenue
Oklahoma City, OK 73102

EXAMINER

WONG, EDNA

ART UNIT PAPER NUMBER

1753

DATE MAILED: 07/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/786,510

Applicant(s)

MORTON, GLENN ROBERT

Examiner

Edna Wong

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 13-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. <u>June 21, 2006</u> . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>See "Other"</u> . | 6) <input checked="" type="checkbox"/> Other: <u>See Continuation Sheet</u> . |

Continuation of Attachment(s) 6). Other: February 26, 2004 and September 6, 2005.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims **1-12**, drawn to a process for converting methane to higher hydrocarbons, classified in class 204, subclass 157.15.
- II. Claims **13-15**, drawn to an apparatus for converting natural gas produced from a well site which is too remote to permit economic recovery of the natural gas through an associated pipeline to a transportable liquid hydrocarbon product, classified in class 422, subclass 186.3.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the process as claimed can be practiced by another and materially different apparatus such as with a microwave apparatus.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02),

restriction for examination purposes as indicated is proper.

During a telephone conversation with Cliff Dordi on June 21, 2006 a provisional election was made with traverse to prosecute the invention of Group I, claims **1-12**.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims **13-15** are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

Claims **6 and 7** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6

line 1, it appears that the "ultraviolet light" is the same as that recited in claim 1, line 2. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "wherein".

Claim 7

line 1, it appears that the "ultraviolet light" is the same as that recited in claim 1, line 2. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "wherein".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

I. Claims 1, 5-6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by **Sherwood** (US Patent No. 6,500,313 B2).

Sherwood teaches a process for converting methane to higher hydrocarbons (col. 1, lines 10-13), comprising:

(a) applying ultraviolet light under conditions effective to cause its photodissociation (= methane is converted to a methyl radical and a hydrogen radical by exposing the gas to ultraviolet light); and

(b) polymerization to C₂+ and higher radicals (= when two methyl radicals combine to produce ethane and two hydrogen radicals combine to form H₂) [col. 1, lines 54-63].

The process further comprises the step of cooling the C₂+ hydrocarbons to provide a transportable liquid hydrocarbon product (= the higher molecular weight hydrocarbons are recovered by condensing the products to a liquid in an air or liquid

chilled cooling) [col. 3, lines 12-15].

The ultraviolet light is applied to the methane in natural gas (col. 2, lines 20-23).

The process further comprises recovering and recycling unconverted methane prior to cooling the C₂+ hydrocarbons to provide the transportable liquid product (= any unreacted hydrocarbon feedstock and by-products recovered from the reaction products may be recycled to the reaction) [col. 2, lines 37-39].

The ultraviolet light is applied within a conduit (= a stainless steel tube) lined with a device emitting ultraviolet light having a photon energy (= a UV lamp) [Fig.1].

The pressure within the conduit is maintained at 10 atmospheres gauge or greater (= maintained at a pressure greater than about 4 psig) [col. 2, lines 51-57].

Since Sherwood teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

II. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by **Gondal et al.** (US Patent Application Publication No. 2005/0045467 A1).

Gondal teaches a process for converting methane to higher hydrocarbons (page 1, [0001]), comprising:

(a) applying ultraviolet light under conditions effective to cause its photodissociation (= pure methane, in a reaction zone, is dissociated by irradiation with an ultraviolet laser); and

(b) polymerization to C₂+ and higher radicals (= as a result of methane

Art Unit: 1753

conversion, hydrogen and higher hydrocarbons are formed which include ethane, ethylene, propane, propylene and isobutane) [page 1, [0001]].

The ultraviolet light is applied to the methane in natural gas (page 2, [0022]).

The ultraviolet light is applied within a conduit lined with a device emitting ultraviolet light having a photon energy (Fig.1).

Since Gondal teaches all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claims **2-4, 7 and 9-12** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Sherwood** (US Patent No. 6,500,313 B2) as applied to claims 1, 5-6 and 8 above.

Sherwood is as applied above and incorporated herein.

The process of Sherwood differs from the instant invention because Sherwood does not disclosed the following:

- a. Wherein per-pass conversion is at least about 45%, as recited in claim 2.
- b. Wherein per-pass conversion is at least about 50%, as recited in claim 3.

c. Wherein per-pass conversion is at least about 55%, as recited in claim 4.

Sherwood teaches that approximately 40 mole percent of the initial methane charged was converted to hydrogen and higher molecular weight hydrocarbons (col. 4, lines 23-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Sherwood with wherein per-pass conversion is at least about 45%; wherein per-pass conversion is at least about 50%; and wherein per-pass conversion is at least about 55% because one having ordinary skill in the art has the skill to adjust the process disclosed by Sherwood to effect a per-pass conversion to at least about 45%, 50% and 55% because the per-pass conversion is a result-effective variable and one skilled in the art has the skill to calculate the process conditions that would have determined the success of the desired reaction to occur (MPEP § 2141.03).

Furthermore, Sherwood teaches a similar process (steps) as presently claimed. Similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

d. Removing non-hydrocarbon impurities in the natural gas, as recited in claim 7.

It would have been obvious to one having ordinary skill in the art at the time the

Art Unit: 1753

invention was made to have modified the process described by Sherwood by removing non-hydrocarbon impurities in the natural gas because the purer the reactants used, the purer the products produced.

e. Wherein the device emitting ultraviolet light is a series of devices emitting ultraviolet light, as recited in claim 9.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device emitting ultraviolet light described by Sherwood with wherein the device emitting ultraviolet light is a series of devices emitting ultraviolet light because the duplication of parts has no significance unless a new and unexpected result is produced.

f. Wherein the ultraviolet light has a photon energy of at least 1.7 electron volts, as recited in claim 9.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the photon energy of the ultraviolet light described by Sherwood with wherein the ultraviolet light has a photon energy of at least 1.7 electron volts because the photon energy of the ultraviolet light is a result-effective variable and one skilled in the art has the skill to calculate the photon energy of the ultraviolet light that would have determined the success of the desired reaction to occur (MPEP § 2141.03).

g. Wherein the process is applied to natural gas produced from an offshore natural gas-producing well, as recited in claim 11.

h. Wherein the process is applied to natural gas entering a natural gas processing plant, as recited in claim 12.

Sherwood teaches that suitable feedstock gas may include methane, natural gas, off gas from decomposing biomass, methane from coal mines, and waste methane gas from chemical processes (col. 2, lines 20-24).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Sherwood with wherein the process is applied to natural gas produced from an offshore natural gas-producing well; and wherein the process is applied to natural gas entering a natural gas processing plant because methane gas is still methane gas regardless of its source. Natural gas produced from an offshore natural gas-producing well has no significance unless a new and unexpected result is produced.

II. Claims 2-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Gondal et al.** (US Patent Application Publication No. 2005/0045467 A1) as applied to claim 1 above, and further in view of **Sherwood** (US Patent No. 6,500,313 B2).

Gondal is as applied above and incorporated herein.

The process of Gondal differs from the instant invention because Gondal does not disclosed the following:

- a. Wherein per-pass conversion is at least about 45%, as recited in claim 2.
- b. Wherein per-pass conversion is at least about 50%, as recited in claim 3.
- c. Wherein per-pass conversion is at least about 55%, as recited in claim 4.

Gondal teaches the effect of laser power, methane gas pressure and exposure time on hydrocarbon production (pages 2-3, Examples 1-3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Gondal with wherein per-pass conversion is at least about 45%; wherein per-pass conversion is at least about 50%; and wherein per-pass conversion is at least about 55% because one having ordinary skill in the art has the skill to adjust the process disclosed by Gondal to effect a per-pass conversion to at least about 45%, 50% and 55% because the per-pass conversion is a result-effective variable and one skilled in the art has the skill to calculate the process conditions that would have determined the success of the desired reaction to occur (MPEP § 2141.03).

Furthermore, Gondal teaches a similar process (steps) as presently claimed. Similar processes can reasonably be expected to yield products which inherently have the same properties. *In re Spada* 15 USPQ 2d 1655 (CAFC 1990); *In re DeBlauwe* 222 USPQ 191; *In re Wiegand* 86 USPQ 155 (CCPA 195).

- d. Removing non-hydrocarbon impurities in the natural gas, as recited in claim 7.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Gondal by removing non-hydrocarbon impurities in the natural gas because the purer the reactants used, the purer the products produced.

e. Cooling the C2+ hydrocarbons to provide a transportable liquid hydrocarbon product, as recited in claim 5.

Gondal teaches that if the methane is converted into some other useful hydrocarbons in liquid form, then the existing petroleum pipeline network can be utilized for transporting methane and hence the cost of transportation can be substantially brought down and the methane resource can be used (page 1, [0002]).

Like Gondal, Sherwood teaches the conversion of methane into hydrogen and higher hydrocarbons using UV. Sherwood teaches that the higher molecular weight hydrocarbons are recovered by condensing the products to a liquid in an air or liquid chilled cooling vessel (col. 3, lines 12-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Gondal by cooling the C2+ hydrocarbons to provide a transportable liquid hydrocarbon product because cooling the methane into liquid form would have utilized existing petroleum pipeline network for transporting methane and brought down the cost of transportation (Gondal, page 1, [0002]).

f. Recovering and recycling unconverted methane prior to cooling the C2+ hydrocarbons to provide the transportable liquid product, as recited in claim 8.

Sherwood teaches that any unreacted hydrocarbon feedstock and by-products recovered from the reaction products may be recycled to the reaction (col. 2, lines 37-39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Gondal by recovering and recycling unconverted methane prior to cooling the C2+ hydrocarbons to provide the transportable liquid product because it is well within the skill of the art to have collected the higher hydrocarbons produced and to have recycled the unreacted hydrocarbon feedstock and by-products in order to minimize the amount of waste produced for ecological and economic reasons. It has been held that changing ecological and economic considerations do not make an obvious expedient into an unobvious improvement. *Ex parte Fuller* 172 USPQ 317.

g. Wherein the device emitting ultraviolet light is a series of devices emitting ultraviolet light, as recited in claim 9.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the device emitting ultraviolet light described by Gondal with wherein the device emitting ultraviolet light is a series of devices emitting ultraviolet light because the duplication of parts has no significance unless a new and

unexpected result is produced.

h. Wherein the ultraviolet light has a photon energy of at least 1.7 electron volts, as recited in claim 9.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the photon energy of the ultraviolet light described by Gondal with wherein the ultraviolet light has a photon energy of at least 1.7 electron volts because the photon energy of the ultraviolet light is a result-effective variable and one skilled in the art has the skill to calculate the photon energy of the ultraviolet light that would have determined the success of the desired reaction to occur (MPEP § 2141.03).

i. Wherein the pressure within the conduit is maintained at 10 atmospheres gauge or greater, as recited in claim 10.

Gondal teaches a pressure of between about 0.5 and 4 atmospheres (pages 1-2, [0007]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the pressure within the conduit described by Gondal because one having ordinary skill in the art has the skill to adjust the process conditions disclosed by Gondal to effect a pressure within the conduit is maintained at 10 atmospheres gauge or greater because the pressure is a result-effective variable

and one skilled in the art has the skill to calculate the process conditions that would have determined the success of the desired reaction to occur (MPEP § 2141.03).

Gondal teaches the effect of methane gas pressure on hydrocarbon production (page 3, Example 2).

j. Wherein the process is applied to natural gas produced from an offshore natural gas-producing well, as recited in claim 11.

k. Wherein the process is applied to natural gas entering a natural gas processing plant, as recited in claim 12.

Gondal teaches that the feed stock may include natural gas, waste methane, chemical process gas, etc. (page 2, [0022]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process described by Gondal with wherein the process is applied to natural gas produced from an offshore natural gas-producing well; and wherein the process is applied to natural gas entering a natural gas processing plant because methane gas is still methane gas regardless of its source. Natural gas produced from an offshore natural gas-producing well has no significance unless a new and unexpected result is produced.

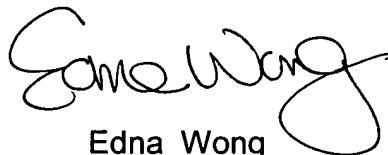
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (571) 272-

Art Unit: 1753

1349. The examiner can normally be reached on Mon-Fri 7:30 am to 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Edna Wong
Primary Examiner
Art Unit 1753

EW
June 28, 2006